Introduction to Scientific Writing: Writing and Reviewing Abstracts

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Preamble

- Reviewing an abstract is very similar to reviewing a scietintic paper. We are looking for the exact same 'ingredients'
- As a formal (invited) reviewer, you will be expected to play two important roles:
  1. To determine if the submitted abstract is of sufficient scientific quality to be 'accepted'
  2. To provide constructive critisim to the author(s) regarding improvement of their work
- Even if you are only informally reviewing an abstract (for your own purposes), the first principle still holds
- However, if informal, there is a third purpose:
  4. How can we learn from the strengths and weaknesses (and mistakes) of others, to generate 'strong' research ourselves?

Conventions

Conventions:

Note:.....

Things to note given in a green box

Pitfalls:.....

Common mistakes and things to watch out for given in a red box

What we cover today (this session)

1. Role of an abstract
2. Components of an Abstract
   - Introductory sections
   - Methods
   - Results sections
   - The discussion
3. Hints for reviewing and writing absracts
   - KISS
   - Reviewing an abstract

Importance of a good abstract

- A majority of scientic papers do not get read in their entirity
- Instead, many researchers will skim a paper briefly to see if it is relevant to their work
- It is the abstract that they will quickly read
- For this reason, a well structured and presented abstract is absolutely essential in getting your work out there (published, and subsequently, cited)
- Often, this is the only oppurtunity for the author to **SELL** their hard work

Different types of abstracts

There are three main types of abstracts that you are likely to encounter:

1. **Thesis abstract**: Usually about 2-3 full pages of text. Will generally provide much more detail (especially in the background) then other types of abstracts
2. **Conference abstracts**: Often smaller (circa. half-full page) and front heavy (Intro and methods) as the main findings may not yet be completed-Many conferences require abstracts to be submitted 6-9 months before the conference
3. **Scientific (journal) paper abstract** (focus today): Again about a half to full page of text. Many will have subheadings, and it is expected that the abstract will represent a sufficient synopsis of the main paper

Abstract structure

Like a journal publication itself, the abstract is similarly structure, with:

1. Background
2. Objective
3. Methods
4. Results
5. Conclusion

Note: Discussion vs Conclusions

- Typically what we think of as a "Introduction" is split into the **Background** and **Research objective** sections
- Most abstracts don't have a Discussion section. Instead, this is typically replaced with a **Conclusions** section (we are restricted to the 'Take home message only')

Role of Intro/Background

- Like any research article, there has to be a justification for doing the research
- Reviewers/editors are busy people, and an author needs to **pull them in** with their problem statement
- The introductory statements (in the abstract) are the first thing reviewers see. If we can't capture their interest here, we have lost them. An author needs to impress on the reviewer the **WOW factor**

Quality and Significance

To get successfully published in a good journal, a paper requires two ingredients:

1. **Signficance:**
   The study must make a substantial contribution to science. It must address a research question worth answering.
2. **Quality:**
   - The paper must follow the conventions of scientific research, and that particular journal
   - Communication: Sufficiently detailed to adequately describe the situation, but also succinct (no waffling)
   - It should have a large and representative sample of the target population, appropriately measure the outcome and effect variables, and employ the approriate statistical approach.

The Introductory statement: Background and Objective

There are three main ingedients in they introductory section:

1. Background statement (Background section)
2. Knowledge gap (Background section)
3. Research objective (Objective section)

In a full paper, authors get full pages to give sufficient background to a research problem, before going on to the knowledge gap. Where the background is well written, the research objective will naturally follow. e.g.

...while the efficacy of dietary interventions on reducing the incidence and severity of T2DM complications has been well studied in western countries, few studies have considered the effect of such interventions in southeast Asian countries like Thailand.

Introduction in (journal) abstracts

Most journals will restrict authors to 250 words in their abstract (some journals it is 200 words). This means we get two to three sentences, at the most, for this section. Often we have to combine two of the three Introduction components listed above. For example:

> *Type 2 Diabetes Mellitus complications represent a substantial burden to both the individual and society. However, few studies in ASEAN countries, like Thailand, have investigated the efficacy of dietary interventions to reduce diabetes complications incidence...*

Reviewing an abstract introductory statement

With this in mind, it is quite a simple matter to review/critque (and write) the introductory statement in an abstract. It should:

- Have all three ingedients ⋈
- Be short and succinct

⋈ The 'general' detail in the background statemnet can be shorter if the article is pitched at a specilist journal (and audience)

The structure of a methods section

For a paper (in general) we can think of the methods section as having three main components:

1. The study sample (**NOT the population**)
2. What was measured and how this was done (Outcome, Study effect, other covariates)
3. Statistical analysis performed

Hint:

As with introductory statements, we have very few words to play with for the methods section. Remember that this is an abstract, and the reader can go to the main paper if they need more details. The main methods points (only) need to be provided in the abstract.

Study strengths and limitations

Before I go further on the methods section, I would like to stress a very important point:

REMEMBER

ALL STUDIES HAVE LIMITATIONS

The important question a reviewer asks is:

Could the researcher have DESIGNED-out or ANALYZED-out these limitations????

The 'Its-not-my-fault' approach to scientific writing

- A good scientific writer is one who can convince a reviewer that any limitation in the study is an **artifact of the system under study**, not their approach
- Consider the simple example of a study of the effect of smoking on CVD. It should be clear that any study of smoking in humans cannot, for ethical reasons, involve a interventions of smoking. This is so clear, it goes without saying, but this is an example where not using an RCT (strongest scientific evidence) was **not our fault**
- Finally it is important to not try to **hide** your study limitations. Reviewers are usually experienced researchers (that is why they are asked to review). If you try to hide limitations, reviewers may think you didn't even notice them (and assume you, and your work, are of low quality)

The lament of the biostatistician

- One of the major problems with being a biostatistician is trying to dealwith the problems researchers didn't think of' when they designed the study
- The art is to try to convert 'oversights' into 'it's not my fault' limitations BUT this is the second best option...
- Good analytical planning is the key to good research
- You can guarantee that if a biostatistican can spot a weakness at the beginning of a project, a reviewer will spot it when it comes to submission

Good research = good study design

ALWAYS consult experienced researchers, peers, epidemiologists and/or biostatisticians when designing a study. You will save much pain and time later down the track.

Methods section for a scientific paper

- Goods research is about scientific replicability
- As a reader, I should have all the details in the methods section needed to (almost exactly) repeat the study
- Typically a methods section will be split up into dfferent parts (with or without sub headings):
  1. Target (or Study) Population
  2. Sample: Participants and study design (including sampling approach)
  3. Measurement procedures and/or variables collected (outcome, study effect and covariates considered)
  4. (if prospective) Sample size calculations
  5. Statistical analysis

If we can't (theoretically) replicate the study exactly from the methods section, it is not acceptable.

Reiteration: Methods sections for a paper abstract

- Clearly (given the word count constraints) a methods section in an abstract can be no where near as detailed as we would like.
- However, a reader must be convinced that the right approach was taken.
- Main things that need to be included are:
  1. The sample (somehow conveying it is representative of the target population);
  2. The main study outcome(s) and study effect(s); and
  3. The main statistical approach used (bivariate/multivariable), and if room, measures of association (e.g. Hazard ratios, odds ratios, etc)***

***If no room, the measures of association can be worked into the results section (see next slide)

Trick to shorten the methods section

In some cases, we can use our results section to convey the statistical approach we used. For example:

Methods: A Thai study of 60,000 T2DM and hypertensive patients from 600 hospitals were assessed for acheivement (y/n) of the ABC (HbA1C, Blood pressure and Serum Cholesterol levels) clinical targets. Associations of target acheivement with type of clinic attended and other important covariates were considered.

Results: Multivariable binary logistic mixed effect regression analysis revealed that patients attending specialized diabetes clinics had XX times the odds of achieving all three ABC clinical outcomes, relative to those attending general outpatient clinics ($OR_{Clinictype}$=XX, 95%CI: XX,XX, p<XX)

Results section in full papers

DOs

- Start off with a brief presentation of sample statistics that can be for the group as a whole, and/or between the main groups (e.g. Treatment or exposure group):
  - For RCTs this is about showing confounders are balanced
  - For observational studies,, show statistics for group as a whole, and then split according to study effect (to show 'other' potential independant risk factors and confounders)
- Figures and/or tables from the main (formal) statistical analysis and a very succint interpretation of the results from these 'statistical outputs'

Results section in full papers

DON'Ts

- Avoid linking results from different analyses
- Never mention the *implications* of these results (i.e. Don't *discuss* them)
- Never *introduce* methods here (unless they are trivial and self-explanatory). This is the role of the methods section.

Results sections in abstracts

- As I mentioned before, if you have no room in your methods, you can work in some of your statistical methods here. E.g:
  ...the Adjusted Hazard Ratio from Cox regression showed that the new drug was effective in increasing survival rates (HR=0.7, 95%CI: 0.64, 0.79)...
- You have very limited room in an abstract, so you may only be able to mention one or two key findings focusing on the study effect (or if an exploratory analysis, the main risk factors identified)
- Generally don't mention your sample descriptive statistics unless it really adds to the story

Discussions, implications and conclusions

In a full paper a discussion is where you:

1. State your main findings
2. Tie these findings in with the literature (agree/disagree)
3. Talk about the strengths and limitations of YOUR study
4. How you findings feed into policy or clinical practice
5. Future research: Mention what 'still needs to be done'
6. Reiterrate your main findings

In an abstract, we have very little room. For this reason, most abstracts require a **Conclusions** rather than a discussion. In this conclusion, we can only talk about items 1 and 4:

1. State your **main** findings
2. How you findings feed into policy or clinical practice: the *take home message*

KISS: Keep it simple, stupid

- One of the hallmarks of a inexperienced researcher is their tendency to 'tech it up'
- Inexperienced writers will also use unnecessary and flowery langauge. Avoid words like: 'moreover','heretofore' and 'aforementioned" instead use the simple corresponding words: 'Also', 'To date', and 'as mentioned above'
- Remember as a reviewer, YOU are the audience. The chances are, if you can't understand it, then the problem lies with the author (not you)

KISS and the discipline

- As a biostatistican, I have reviewed articles (and abstracts) from a diverse range of disciplines
- One of the areas I HATE reviewing articles is from the 'pre-clinical' sciences (e.g. biomedicine, genomics etc)
- Biomedical (and also psychology) articles are typically jargon-rich and for some reason, this seems to be accepted in these disciplines

Pitfalls in writing

In your own writing, avoid jargon (at least, where possible) and flowery langauge. Simply written is ALWAYS best.

Reviewing and abstract: Grade it

One of the simplest ways of reviewing an abstract (including your own) is to grade it:

- Introductory section (Background and objective): 10 marks
- Methods: 10 marks
- Results: 10 marks
- Conclusions: 10 marks

and then finally....

- Cohesion (how it all fits) and communication: 10 marks

  Does the abstract flow natural? Have they kept the langauage as simple as possible, or have they 'wasted' words?

Reviewing an abstract

In the end, there are two main aspects we need to consider in writing or reviewing an abstract (or a manuscript, for that matter):

1. Scientific **significance**: Is the (research) question worth answering?
2. Scientific **quality**: Did the author(s) do a good job in addressing the research question? Was it in their power to improve the quality (strength of evidence) or 'Wasn't it their fault'?

If you keep this in mind when reviewing anything, you are most of the way there.

Concluding remarks

REMEMBER!!!!!

- Every word costs a $1 (30 baht): Keep it short and sweet
- What role each section is supposed to play?
- The audience: do they have background knowledge so the author doesn't have to spell out so much background
- Is the subject area relevant and does the work make a significant contribution (Is there an important knowledge gap identified)
- Is the scientific quality there?

Any questions??????

Thank-you!!!!!!

QUESTIONS???

Stay tuned for exercizes...

Exercise 1

1. From each row, someone should be willing to present their abstract (even if it s a work-in-progress)
2. **EVERY** (other) person in that row is expected to either ask a question, or make a comment that may improve the quality of the abstract (REVIEW)

To crique (and be criticized) are VERY important skills if you are to become strong researchers. **PLEASE PARTICIPATE!!!!**

It is not only good for improving your own research skills, but is a way YOU can contribute to the improvement of your colleagues, and quality of the research overall.

Exercize 2: Homework

Two articles:

1. Pagani et al. (2013) Prospective associations between early long-term household tobacco smoke exposure and antisocial behaviour in later childhood
2. Rautiainen et al. (2012) Total Antioxidant Capacity from Diet and Risk of Myocardial Infarction: A Prospective Cohort of Women

NOW:

- Using their abstracts alone comment on their quality
- What might you have done differently